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Editorial Comment

ON TO SAN FRANCISCO ALL organized medicine is urged to attend the American Medical Association Convention to be held in San Francisco the week of June 13th, 1938.

The Fellows of the American College of Chest Physicians are especially urged to attend the ANNUAL CONVENTION of the AMERICAN COLLEGE OF CHEST PHYSICIANS to be held at the St. Francis Hotel in San Francisco on Sunday, June 12th, 1938, which is the day preceding the A. M. A. Convention.

Our Officers on the West Coast are arranging a Meeting which will be important to every one of us.

F. W. B.

PHILADELPHIA - PENNSYLVANIA PLAN IS PROGRESSING IN PENNSYLVANIA WE now have twenty-two County Medical Societies in this State that have Tuberculosis Committees to work on the problem of bringing

about reform in the State Tuberculosis Sanatoriums and State Tuberculosis Clinics. We hope to bring about the formation of a State Commission to draw up a proper code of laws to make the following important changes a matter of law:

1. Proper living quarters for the sanatorium doctors and private cottages for the married doctors and their families;

2. At least one doctor to fifty patients;
3. Security in their jobs for the sanatorium employees under civil service;
4. Salaries for doctors, at least equal to that paid in the Army and Navy, with a rising pay scale;
5. Sufficient nurses, ward maids, and orderlies, to do the work of the institutions so that the patients are not called upon to do the work.

We are informed that the base pay of doctors in Pennsylvania State Sanatoriums has been recently raised from \$100.00 a month and maintenance to \$150.00 a month and maintenance. While we have not been able to officially confirm this, if it is true we wish to congratulate the Health Department of the State of Pennsylvania for taking a step in the right direction.

F. W. B.

APHORISMS— *COUGHING up blood usually comes from a blood vessel in the throat:—* This is the explanation so often

given to the patient. He feels relieved and goes happily on his way. The truth is that coughed up blood very rarely comes from bleeding vessels in the throat—excluding, of course, those instances following tonsilectomy—but rather is in most instances due to some serious trouble in the lungs. This trouble most often is tuberculosis; but bron-

chiectasis, lung abscess, and bronchogenic carcinoma may give rise to this occurrence. The harm done in glibly giving the above assuring explanation is obvious.

Your lungs are as clear as a bell, I can't hear a thing:— This is told to many a patient following a physical examination of the chest. Unless an x-ray examination is made, many cases of pulmonary tuberculosis will be overlooked. There may be few or no abnormal physical signs even in advanced disease—and this when the physical examination is made by an expert. What must be missed in the hands of others! It should be well understood that no case is thoroughly examined for tuberculosis without the x-ray examination. Some examiners may become so proficient with the fluoroscope, using the new fast screen, that the need for the more expensive films can at times be omitted. Only the specialists should take this liberty, and they sparingly.

The attack of pleurisy was caused by exposure to cold:— If it were said that the pleurisy was caused by exposure to the tubercle bacillus, then it would be more correct. Exposure to cold must cause pleurisy only rarely without the assistance of the tubercle bacillus. It is now very well and generally recognized that the great majority of the cases of pleurisy, particularly when associated with an effusion, is due to a tuberculous infection. In every case of pleurisy, therefore, this etiology should be kept in mind, and the patient handled accordingly.

That run-down feeling calls for a tonic:— Yes, but not the kind of tonic that comes in a bottle. In very many instances that run-down feeling is caused by pulmonary tuberculosis, and the tonic needed is the prolonged, adequate care for which this condition calls. Be sure that tuberculosis is not present in these below par individuals before prescribing that tonic in the bottle or pill box. C. H. H.

AN AVOIDABLE TRAGEDY IT WAS a low brown red brick building, spacious but unpretentious, resting snugly in the rear of a rather massive and somewhat foreboding structure. Although relegated to the rear, playing apparently the role of humility in relation to its larger companion; within its walls lay the heart throb

of the whole institution. This was the outpatient clinic to its big brother the city hospital.

Into this low brown red brick building there came one afternoon a patient wracked with cough, the ravages of want and fever upon his face, the tottering gait of one nearly spent in his struggle with a hopeless illness. Examination readily revealed the presence of hopelessly far advanced pulmonary tuberculosis. The shadow of death was upon him.

The efficient file clerk readily produced his previous admission card, disclosing that five years ago he had been admitted to the hospital, through the clinic, for a pleurisy with effusion. The record also showed that his pleurisy had been adequately and satisfactorily treated and that he was discharged as cured. No follow-up advice was given. He had been turned away "foot loose and fancy free." Still basking in the warmth and assurance of his recovery, he permitted the silent mischief in his lungs to insidiously advance until the overwhelming realization of illness descended upon him.

He was probably told when he returned to the clinic that afternoon that he had a weakness for chest troubles. It does not take a great stretch of imagination to tell where the weakness really was. It was in the knowledge and experience of those who first attended him. He should have been handled as a case of potential pulmonary tuberculosis when first seen with the pleurisy with effusion. If this had been done, then the story just told need not have been written. C. H. H.

WHAT TO READ WHILE it has been off the press for some time, the work now to be referred to is a classic in the literature of tuberculosis. It happens that age is a characteristic of the classics. They enrich with time. So time has mellowed and sustained this wonderful auto-biography of Dr. Edward Livingston Trudeau in all its attractiveness, pathos and interests. Not only is it a book of exceptional scientific interest but a beautiful story. It graces the shelf of the scientist as well as the connoisseur of literary achievement. It is the story of that great pioneer in tuberculosis, and of that lovely character, Dr. Trudeau. It is an auto-biography. Anyone, and who shouldn't be

interested in the beginning of the fresh air and sanatorium treatment of tuberculosis, will find in this book the unfolding of that vitally important era. It is told in the manner, in the garb, of an absorbing story, with love and tragedy delicately woven into the pattern of the fabric. The book consists of 322 pages, and is published by Doubleday Doran & Co.

Now for the consideration of a work of a strictly scientific character. This is Goldberg's *Clinical Tuberculosis*. It made its debut into the tuberculosis literature in 1935. It is published in two volumes by F. A. Davis Co. In addition to the excellent chapters by Dr. Goldberg himself, there are 33 other collaborators. All of them are men who hold imminent positions in their respective fields. It gives the complete story of pulmonary tuberculosis from epidemiology to the most recent collapse procedures. Tuberculosis of the other organs of the body is likewise very fully and ably dealt with.

C. H. H.

BACK TO

FUNDAMENTALS

WITHIN the next few weeks, three very important medical assemblies will be held in this country. The National Tuberculosis Association will meet in Los Angeles, California, The American Medical Association and American College of Chest Physicians will meet in San Francisco.

From a study of Advance notices of the programs of these meetings, one is stimulated with the knowledge insofar as tuberculosis is concerned, that the best minds still recognize the fact, that the end of tuberculosis is not "just around the corner." A glance at the programs shows us that more and more attention is given to the importance of the private practitioner and his role in the tuberculosis problem. The stressing of case finding, especially in school surveys; the isolation of infectious cases is being emphasized more and more.

In taking stock of all the facts and truths developed down through the years, it seems now that more thought should be given to the fundamentals in the control of the disease than to re-hash the best methods of therapy. Treatment, of course, is necessary—research must go on, but the most important thing in the whole problem is prevention and control.

We have known for years that tuberculosis

is a preventable disease; that in finding a case early we almost invariably effect a cure; that by the isolation of positive sputum cases, we control the spread of disease. Why not concentrate on these vital fundamentals.

First, by making and keeping the general practitioner tuberculosis-conscious. Second, by tuberculin testing of all school children, and then tracing all contacts. Third, isolate and educate all positive sputum cases. In order to carry out Nos. two and three, new laws may be required in many states. I do not believe it will be hard to have such laws put on the statute books, as our law makers have always aided in providing the necessary legislation in the control of communicable diseases.

There is little doubt in the minds of most of us that we have reached a stalemate in the reduction of mortality among the moderately advanced, and advanced cases of tuberculosis. True, many lives have been prolonged and made useful, but the ultimate cause of death in most cases has been tuberculosis. Therefore, early diagnosis is the only sure way to prevent deaths from tuberculosis. Isolation and control of all sputum positive cases is the only sure way to prevent new cases developing.

If we take stock of our accumulated knowledge, the above-named facts are apparent to all of us. The decline in the death rate during the past twenty years should not make us complacent, especially since the decline stopped rather sharply in 1937; and we still have the alarming fact that the death rate among negroes is the same today as it was among the whites twenty years ago.

Most assuredly, the education program should go on, but a more specialized program should be evolved. The program should be carried to the physician in his daily practice, and to the medical student in college. The program should be taken to our law makers where laws are inadequate, to our school boards and college presidents.

The American College of Chest Physicians, by concentrated effort, and by use of their *Journal, Diseases of the Chest*, can do much toward the further control of tuberculosis by continuously emphasizing the fundamentals of early diagnosis and the isolation of open cases.

C. M. H.

Arrested Pulmonary Tuberculosis

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THE American Sanatorium and National Tuberculosis Association define the term *arrested* as follows: All constitutional symptoms and expectoration with bacilli absent for a period of six months; the physical signs to be those of a healed lesion; and the roentgen-ray findings to be compatible with the physical signs. The American Sanatorium Association first adopted a classification in 1909. Since then modifications have been made several times. These changes have been made of necessity because of the advances in the knowledge of the disease.

In the past, constitutional symptoms were considered of prime importance in determining activity. The patient was diagnosed, classified and treated largely according to the temperature, pulse and weight. This was a crude method. Elevation of pulse and temperature and loss of weight may be due to causes other than tuberculosis and active cases may present normal pulse and temperature with no loss of weight. Rales, like heart murmurs, have been much misunderstood, over-emphasized and maligned in interpretation. Rales have been described and classified ad infinitum. A few years ago some physician imbued with the spirit of research and possessed of statistical mind, reviewed the literature and described fifty-seven varieties of rales. This demonstration of confusion is evidence of the weakness of interpretation of the same. Not long ago rales meant moisture in the lungs and moisture meant activity. Now, we know from the result of clinical, pathological and anatomical researches that even the most usual type of rales heard in pulmonary tuberculosis—those heard on inspiration after cough—are not due to moisture in the alveoli but due to partially collapsed alveoli in process of expansion. Such rales may be heard in all types of pulmonary tuberculosis, active, quiescent and arrested. The extent of the rales likewise must receive most conservative interpretation as to clinical significance. Heise of Saranac, published some very striking facts on observations of the increase or diminution of rales. His re-

port was based on a study of 412 records over a six month period. He divided his cases into four classes:

Class A—When rales remained the same as to area and character—111 cases; 103, or 93 per cent, showed x-ray improvement; 2, or 2 per cent, showed x-ray increase; 6, or 5 per cent, showed no change.

Class B—When rales were found over a greater area—92 cases; 65, or 71 per cent, showed x-ray improvement; 5, or 6 per cent showed no change; 22, or 23 per cent showed x-ray increase.

In Class B, if the clinician had come to the conclusion that the patients were worse because they had an increase in rales, he would have been 23 per cent right and 77 per cent wrong.

Class C—When rales showed a diminution of area—83 cases; 73, or 88 per cent, showed x-ray improvement; 5, or 6 per cent showed x-ray increase; 5, or 6 per cent showed no change.

Class D—When rales appeared after treatment and not before—51 cases; 40, or 78 per cent, showed x-ray improvement; 3, or 6 per cent, showed x-ray increase; 8, or 16 per cent, showed no change.

In Class D, a clinician going on the theory that the appearance of rales meant progression of disease would have been 94 per cent wrong and 6 per cent right. It was his conclusion that the increase or diminution of rales could not be used to interpret the patients progress.

It was not until 1922 that x-ray findings were given consideration in the classification. The medical profession at large were very hesitant in accepting the use of x-ray studies in the diagnosis of pulmonary tuberculosis. Now it is generally accepted that no chest diagnosis is complete without x-ray study. Likewise, it should be considered that no case is properly studied or treated unless serial x-ray studies of the lungs are made at rather frequent intervals. Much is being written about latent tuberculosis Patients, especially children or young adults, who look well, feel

well, have no fever and show no abnormal physical signs, show definite tuberculous lesions in the lungs by x-ray studies. These parenchymal lesions may be called latent but most of them are pathologically active and it only remains for time to demonstrate their clinical activity. Likewise, a case of active pulmonary tuberculosis under treatment with bed rest does show relief of symptoms, loss of temperature and gain in weight, usually in a few months. But, the serial x-ray chest films demonstrate that it takes at least a year and usually two or more years before pathological healing takes place. It is not within the province of this paper to discuss the x-ray study of healing, except to mention that *arrest* means lack of any extension of the lesions, increased fibrosis or calcification with contraction of the lesions, lack of any development of pleural fluid, or else demonstration of healing by absorption of exudate. An x-ray study of the chest in thoughts and terms of anatomy and pathology gives us the most comprehensive and accurate diagnosis of the disease and this of necessity is the most valuable and reliable method in the classification. Only by the combined observations of symptoms, clinical signs, laboratory tests and emphasized x-ray studies can we arrive at a safe conclusion of pathological as well as clinical arrest of the disease.

After clinical arrest of the disease is attained by rest and adjunctive treatment the physician is frequently confronted with his most troublesome period in the cure. The patient has gained weight, looks well and feels well. His cough is gone, he has no fever. His family and friends are starting to tell him that if he stays in bed he will get weak. This is the dangerous time to compromise. The thermometer and scales indicate that improvement has taken place but pitfalls are certain if these signs are used as guides in further treatment. Healing has only progressed to the stage when the capsule around the tubercle is sufficient to cut down absorption of toxins into the blood. This is the time when the physician must advance the education of the patient and family and test his art of practice against the wholesale cures offered by friends, acquaintances and quacks. The serial x-ray chest studies must be the guide of progress.

When ultimately complete arrest—clinical and pathological—are accomplished the problems of treatment still do not cease. It is not uncommon first, to be confronted with the task of getting a patient to go to bed early in the cure, and now near the end of cure to meet the job of making him get out of bed. Fear and uncertainty must be overcome and a hard proposition it may be. Not uncommon are the complaints of rapid pulse, pains in the chest, sweating and weakness. These are usually nervous phenomena, but pleurisy pains, night sweats, rapid pulse and fatigue of toxæmia must be differentiated. The physician must be certain of the pathological changes taking place and then with absolute assurance guide the patient in his feelings of apprehension.

But more real than these functional disturbances may be some more objective signs and symptoms which cause much discomfort and alarm. First, I would mention cough and expectoration, the result of residual bronchiectasis. Bronchiectasis is very common in fibroid tuberculosis of long standing. Three factors act in the production of the dilatation: 1, a lesion leading to softening of the bronchial wall; 2, a distending force; and 3, traction on the wall from without. The long standing chronic pulmonary inflammation has led to impairment of the integrity of the bronchial wall; the weight of accumulated secretions together with cough represents a distending force; the pulmonary fibrosis and pleural adhesions consequent of healing constitutes extra bronchial traction. In collapse therapy such as pneumothorax, or thoracoplasty, the impaired expansion of the lung in areas which are not perfectly collapsed, leads to accumulation of secretions, and the formation of fibrous scar in the lung and pleura add traction from without the bronchial wall. The bronchiectasis is also very apt to occur in an area where there has been closure of a cavity by fibrous scar or else in the lower portion of the lungs where there has been accumulation of sputum especially where caseous bronchopneumonia has once existed. The branch of the upper lobe bronchus on the left side which runs down into the lingual tip is very prone to show bronchiectasis. This is due to the gravitation of secretions into this area and the common

presence of pleural adhesions between lung and pericardium. The cough occurs in paroxysms and an early morning attack is almost invariable. This may be repeated several times a day. Expectoration in considerable amounts occurs with the paroxysm of cough. The sputum is yellow, purulent and odorous. Between paroxysms, cough and expectoration are slight or absent for hours. These attacks are very distressing to the patient. After long months or years of treatment he has regained the feeling of health. He has been told his case is arrested. He is allowed to go back to work and resume the normal social contacts of life. But cough and expectoration, very likely the first and most significant symptoms of the disease, are still with him. This proves doubly distressing and embarrassing because any time or any place he may be seized with a paroxysm of cough and expectoration. Not only the patient but also his family, friends and associates are possessed of the belief that cough means tuberculosis and the danger of contagion still persists. It is difficult for the physician to explain to the patient that this cough and expectoration is different and surely one cannot expect his associates to thoroughly understand. Not infrequently the sputum is blood tinged and frank haemorrhages may occur from time to time. The appearance of blood especially a haemorrhage of considerable amount adds greatly to the fear of the patient. It is only with great difficulty that the physician can assure the patient and family that no serious set back has taken place. Especially is this true if recurring haemorrhages take place, as is not uncommon. To be of service to the patient the physician must be certain that the bleeding is of bronchial origin and then speak with assurance and authority. To be certain in this point the physician must be ever informed of the exact pathological progress of the lesions by repeated sputum examination and serial x-ray chest plates. The use of lipiodol injections into the bronchi for x-ray studies has proven of great value not only for diagnosis but also therapeutically in these cases.

Emphysema in some degree is certain to develop in every case of chronic fibroid tuberculosis. This emphysema is largely compensatory where the air vesicles of local areas

are over inflated as the result of receiving air which should be distributed in another part. It occurs adjacent to areas of fibrosis. It may occur throughout an entire lower lobe or a whole lung as a result of extensive fibrosis or pleural adhesions in the upper chest or opposite side. In support of the expiratory theory of emphysema it is easy to comprehend how long continued cough with violent expiratory effort increases the intrapulmonic pressure and as a result the alveoli become over-distended. If the patient is young and of good muscular development the chest may present the shape and signs of hypertrophic emphysema, with rounded appearance, deep anterior posterior diameter, obtuse subcostal angle, obscured heart apex beat, low diaphragms and poor upward excursion of the lower ribs. If, however, the patient is older or poorly developed and nourished, the picture of atrophic emphysema is seen with the chest small, flattened, shoulders drooped, costal angle acute, diaphragms high in position and fixed, heart apex beat visible and prominent. Cyanosis of the finger nail beds with some incurvation of the nails is frequently noted. The x-ray findings in any case of emphysema are interesting and striking. In addition to verifying the position of the diaphragm which is usually low unless fixed by adhesions, the distribution and position of the bronchial markings is noted. By comparison with the normal it can be seen that these trunk markings are most widely separated. The lobe which shows the most extensive fibroid scars is contracted upward while the lower lobe is enlarged and extends upward higher in the chest than normal. But most interesting and significant is the study of the pulmonary arteries. In a normal x-ray chest film, the pulmonary arteries are noted chiefly by a knowledge of their position—on the right side just below the main bronchus to the upper lobe and on the left side just above the main stem bronchus. In emphysema the shadow of the pulmonary arteries is so increased that they are easily seen and noted. This is undoubtedly due to the congestion of the pulmonary vessels with consequent dilatation of the pulmonary arteries. These findings are confirmed by autopsy studies. I have heard a well known pathologist state that on opening the chest he could always predict

the finding of pulmonary emphysema when he looked at the size of the pulmonary arteries.

Dyspnea is the chief symptom produced by the emphysema. Later cyanosis on exertion may be noted. The dyspnea is usually expiratory and asthmatic wheezes may be heard. The emphysema tends to increase even though the pulmonary tuberculosis becomes more healed and the fibroid lesions more contracted. Asthmatic attacks are not uncommon. The patient is also subject to recurrent attacks of bronchitis, such as occurs in any pulmonary emphysema. It is not unusual and often confusing to see a patient rather acutely ill with high fever, cough and expectoration; physical examination shows impaired resonance over some portion of the upper lobes and numerous rales and wheezes are diffusely scattered over both lungs. The patient may or may not give a previous history of pulmonary tuberculosis. The appearance of the patient, the impaired resonance over the upper chest denoting some consolidation most probably old fibroid lesions, the numerous rales diffusely scattered in both lungs and the presence of emphysema should make a picture for you of an old case of pulmonary tuberculosis who is suffering an acute exacerbation of recurrent bronchitis. Too often the rales heard are interpreted as being due to extensive active tuberculosis. The pulmonary emphysema developing in a case of arrested fibroid pulmonary tuberculosis and tending to become more severe, with accompanying recurrent bronchitis and asthma, constitutes a complication which adds greatly to the permanent disability of the patient. The arrested pulmonary tuberculosis may be only moderate in extent and minimal in significance and yet the accompanying emphysema may be severe.

Fortunately, we are normally given about nine times as much lung as is necessary to sustain life and at least three or four times as much as is necessary to follow an average occupation. Therefore, the destruction of lung tissue and loss of lung function can be great before serious handicap from that source alone develops. The addition of complicating sequelae adds greatly to the disability. Pulmonary tuberculosis heals by formation of scar with fibrous tissue and calcification or

else by absorption of exudate. Both of these healing processes take time. But, given the minimal case or even the moderately advanced with little or no cavity formation, the healing in the average individual, endowed with resistance, goes on to good clinical cure, if rest for sufficient time is taken. The patient that suffers serious sequelae is the one who delays treatment until the lesions are advanced with considerable lung destruction or the one who pursues the rest treatment incompletely and as a consequence suffers repeated relapses of activity. Each reactivation means extension of lesions and more lung destruction. Most failures of cure in treatment are the result of improperly applied or insufficiently applied rest. This is particularly true of patients with small lesions and slight toxæmia, who quickly become symptom free and are then unwilling to submit to the prolonged care which is necessary for healing. The duration of the bed rest varies greatly and cannot be predicted. It should be continued until all evidences of clinically active disease have disappeared and afterward until it has been shown by repeated x-ray chest examinations that pathological arrest has been attained. The average cases diagnosed early when the lesions are minimal or early moderately-advanced offers great chance with sufficiently prolonged rest to come to complete healing without the serious sequelae which are brought about by weakening and destruction of lung tissue, long continued cough, accumulation of secretions and extensive fibrous scar formation. Make haste slowly has no better application than in the cure of pulmonary tuberculosis.

Conclusions

1. Arrested pulmonary tuberculosis should embrace the condition of pathological arrest of the lesions as well as clinical arrest.
2. Repeated x-ray examinations are necessary to be certain of the accomplishment of pathological arrest.
3. Bronchiectasis and pulmonary emphysema are frequent and serious complications in cases of arrested fibroid tuberculosis.
4. Healing without serious complications can be attained in cases diagnosed early and given proper rest for sufficiently prolonged period of time.

Early Diagnosis of Pulmonary Tuberculosis

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WITH the decline in the death rate from tuberculosis of 204 per 100,000 in 1904 to 50 per 100,000 in 1936, some may ask why there should continue to be so much talk and so many papers concerning the early diagnosis of pulmonary tuberculosis. However, when one considers the fact that tuberculosis still kills more children under twenty-one than any other disease and more adults between the ages of twenty-five and forty-five than any other disease, surely we are justified in keeping the early diagnosis of tuberculosis one of the foremost subjects for discussion at our society meetings. Twenty-five years ago I thought that, when we old men died off and the younger men who had had training in tuberculosis during their college courses took our places, we should have more early diagnoses. But I am sorry to say that I see very little difference in the number of far-advanced cases admitted to the sanatoria today than twenty-five years ago.

The diagnosis of early pulmonary tuberculosis should not be difficult if we keep in mind what we are looking for. Dr. Lawrason Brown says, "The most important factor in the diagnosis in the majority of cases of Pulmonary Tuberculosis is keeping the disease in mind." In some cases the diagnosis can almost be made from the history alone. And the first step in diagnosis is to take a very careful history, both family and personal, paying particular attention to history of contact during childhood. At this point I think we may mention the Mantoux test of high school pupils and then of all pupils down through the grades. If we make a thorough chest examination and x-ray all reactors, then we shall get a number of childhood type, minimal and advanced cases out of the school room and reduce the number of contacts. In the future the school is going to be one of the largest battle grounds in our fight against tuberculosis.

The onset of tuberculosis may be varied. Oftentimes the first symptom is a gastrointestinal disturbance, the so-called "nervous

indigestion." This may be a secondary condition, and the real cause of it may be pulmonary tuberculosis. It may have lasted for months and resisted all treatment with medicine. Unless the chest is examined, the real cause will not be determined. If we give every patient a thorough examination including the chest, no matter what he consults us for, then and only then shall we get our cases early.

Fatigue is very often one of the early symptoms of pulmonary tuberculosis. The patient will say, "I have no pep"; "I am just as tired in the morning as when I go to bed, my sleep does not rest me"; "All my work is an effort, where it used to be a pleasure. I have to force myself all the time"; or, "I have lost my steam," as a physician patient told me.

Colds: We should be suspicious of patients who complain of one cold after another which hang on for weeks, with or without expectoration. A familiar statement to all of you is, "I had a cold or the grippe or influenza, and I have never lost my cough or regained my strength. I just cannot seem to get back on my feet." Very often this history spells active disease.

The *Cough* may be slight or excessive, with or without expectoration. Many patients will say that they do not cough; but upon close questioning, they will admit that they have had a slight hack with a little mucous in the morning for some months. Of course if the sputum is examined and is positive, that confirms the diagnosis. *A positive sputum always confirms, but a negative sputum never denies.* We should have a large number of concentrated, seventy-two hour sputum examinations in all cases where we suspect active disease.

Loss of Weight may be slight or it may be marked. If it cannot be satisfactorily explained, it should be considered as an important symptom in the diagnosis of tuberculosis. Generally with a loss of weight there is a loss of appetite and a loss of strength, which is very important and often one of the

very early symptoms.

Night Sweats appear early in the disease in some cases, in others not until the disease is advanced and in some cases not at all. When night sweats do appear as an early symptom, together with other suspicious symptoms, we should always bear in mind the fact that the patient might have tuberculosis.

Pleurisy: Any patient giving a history of simple pleurisy should make us suspicious of tuberculosis. Pleurisy with effusion, except traumatic or due to pneumonia, abscess or malignancy, should be considered tuberculous and treated accordingly until tuberculosis can be definitely excluded.

Fistula In Ano is also very suspicious and is often of a tuberculous origin.

Blood-Spitting is a very important symptom and, no matter how small the amount, it cannot be ignored. This does not mean that all expectorated blood is due to tuberculosis, as we know it may be due to foreign bodies, mitral stenosis, malignancy, bronchiectasis and many other causes; but the patient should be treated as though he had tuberculosis until it is proved otherwise. I believe it would be a good thing if every patient expectorated some blood at the onset of his disease. This would frighten him so that he would consult his physician and we should get an early diagnosis.

A careful study of *Temperature and Pulse* will give the physician as much information regarding the patient's condition as the study of any one symptom. This does not mean taking the temperature once a day and that in the morning. Only advanced cases have a temperature at that time of day. In females we may have a slight rise in temperature just before and during the menstrual period. The temperature and pulse should be taken at 8 a. m. and 4 and 8 p. m. over a period of several days. A sub-normal temperature in the morning with a pulse of 100 or over, if continued over a period of time, demands very careful study. A continued slight rise in temperature in the afternoon or evening of 99.2 or 99.4 or over, with other symptoms, such as loss of weight, appetite and strength combined with a few night sweats is very suggestive of tuberculosis. We often see these slight rises in temperature attributed to malaria,

slow fever, para-typhoid, typhoid with negative malarial or auto-intoxication, when they are due to nothing but tuberculosis. Dr. Hawes says, "If the stethoscope were used less and the thermometer more, fewer mistakes would be made."

Having completed our study of history and symptoms, we turn to the *Physical Examination*. This includes inspection, palpation, percussion and auscultation. On inspection, we note the type of chest, retraction or limited expansion on one side, bulging of the chest as in effusion and empyema, retraction above or below clavicles, scars, enlarged glands, pulsations, atrophy of muscles or breasts, displaced apex beat, displaced trachea, curvature of spine and clubbing of fingers.

By palpation we may detect apex beat, heart thrill, rigidity of muscles, and increase or decrease in tactile fremitus. By percussion we may have from slight impairment in resonance to dullness, flatness or tympany. On auscultation we may find harsh breath sounds, cog-wheel breathing, weak breath sounds, cardio-respiratory murmur, different heart murmurs, broncho-vesicular breathing, prolongation of expiration, pleural friction, and coarse, fine and indeterminate rales. Persistent fine moist rales after the expiratory cough are generally due to tuberculosis.

Of course we should have all *Laboratory Studies* made, including blood studies and sedimentation rates. In every case we should check with an x-ray picture. Sometimes it will not agree with our physical findings and other symptoms, but we should not fail to take pictures, especially in questionable cases.

I fear that some of us pay too much attention to physical signs and not enough to symptoms. If we have symptoms without physical signs, we must consider them very seriously before dismissing them as of no value. I think it was Dr. Lawrason Brown who said, "Physical signs without symptoms demand watching, but symptoms without physical signs demand treatment."

In Conclusion

Always take a very careful and complete history.

Be suspicious of patients with slight morning cough, with or without expectoration, and showing loss of weight, strength and appetite, with perhaps a few night sweats.

Consider a simple pleurisy other than traumatic as generally tuberculous, and pleurisy with effusion as always tuberculous, until it has been excluded.

Consider any expectoration of blood as coming from the lung and due to tuberculosis, until it is proved otherwise.

Influenza cases with slow convalescence

and unresolved pneumonias should be carefully watched.

Any patient with continued rise of temperature and pulse unless accounted for should be considered a suspicious case of tuberculosis.

Examine the chest of every patient, regardless of what he or she consults you for.



The Value of Inspection in Physical Examination

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INSPECTION is the oldest form of examination. Men used their eyes before they learned to use their fingers or ears. Of course, primitive man may have used his nose in the same manner as the other animals but, doubtless, used his eyes first.

Hippocrates laid much stress on the expression of the face, in which he may have been a follower of his Egyptian predecessors. We are familiar with the four great types of human character or temperament of the middle ages—the sanguine, phlegmatic, choleric and melancholic, classified chiefly by their appearance. We have also seen pictures of the physician of that time performing urinalysis by inspection alone.

Most of us have vivid memories of our childhood or adolescence, when some sharp-eyed grandmother, experienced aunt or officious neighbor peered at us and announced that "the child looks peaked."

The discovery of the stethoscope, the use of the percussion hammer, the thermometer, microscope and the host of precision instruments and diagnostic aids, which are features of modern medicine, have caused a certain amount of neglect of the ancient and still valuable art of inspection, which, when approached with the proper amount of enthusiasm, has all the fascination of a story by a physician named Conan Doyle. Its revival should prove an inspiration to recent graduates and a reawakening to older men.

The late Landis of Philadelphia, made inspection somewhat of a hobby. He was fond of ranging his clinic patients on one side of

the room and his students on the other, then asking for a diagnosis or at least a careful description of what might be observed before proceeding to other methods of examination. William E. Hughes of the same city, made many apparently intuitive diagnoses by a sudden, shrewd glance from his narrow, Celtic eyes and has never needed a hemaglobinometer. Stoll, of Connecticut, emphasized inspection most graphically in the production of his motion picture for the medical department of the Army, at the time of the war. The public health service, during the period of heavy immigration through its station at Ellis Island, was obliged to rely largely upon scrutiny of the disembarking aliens as they approached its officers in long files. After weeks of such duty it was only natural that the habit should be formed of "passing" the occupants of a street-car or the crowd in the subway, picking out the various defects—shape of head, character of hair, color and texture of skin or features which showed the stigmata of degeneration.

As the patient enters your consulting room he gives you a brief opportunity of noting his characteristic gait and posture. Does he step in with a business-like air and sit down with the use of his muscles or does he merely drift in, in a vague sort of way and dump himself into a chair, then "sit on his shoulder blades"? Does his clothing fit and does it indicate carelessness or pride? Does he sit in quiet dignity or is there a nervous restlessness; with foot swinging, hip shifting, finger tapping? As he removes his clothes, is he brisk

and methodical or slow and unsystematic? If he has rested sufficiently, let us look at him first as he stands near a wall of neutral shade, facing the light. A word of caution at this point—inspection has been so generally neglected that in order to avoid embarrassment, it may be necessary to explain to the patient that he or she is about to be *looked at*, searchingly, before applying the hands or the stethoscope. Once, while thoughtfully appraising the contours of a handsome female, I was suddenly asked, "What's the matter? Are you an artist?"

Note the posture assumed naturally, then with a relaxed approximation of the position of "attention." What of the figure as a whole; the proportions and attitude of the head, chest, abdomen and extremities? While, chiefly interested in the chest, we may gain considerable information relative to it by also considering the head and abdomen. As to the head, what is its size and shape? Are the temples sunken? What is the color, quantity, distribution, and quality of the hair (dry, fine, downy)? Also the condition of the scalp (parasites)? What is the shape and expression of the face, its color (pallor, flush or jaundice)? Does the skin show eruptions, lines or wrinkles? Does it sag or is it tightly drawn? Note the size, color and brightness or dullness of the eyes; are they sunken, ptotic? Is there inflammation or jaundice of the sclerae? Are the lashes unusually long or the pupils dilated? A unilateral, recurrent, transitory dilatation is very suggestive of tuberculosis. The size and shape of the nose should be studied with particular reference to the nostrils; their size and movement. Is the mouth open, drooping, relaxed or grimly tight? Are the lips thick or thin? Any herpes? Don't neglect a look at the teeth. Are the ears pink or pale? Any discharge? What of the shape, length and nutrition of the neck? Are there nodes or scars of tuberculous adenitis? Is there distention or abnormal pulsation of the blood vessels? Are the auxiliary muscles overworked? Is the thyroid enlarged? Is the trachea prominent or out of line?

In considering the upper extremities we should note the muscular development or atrophy and their symmetry, with particular reference to the shape, color, and manner of use of the hands and the presence of pits

or ridges on the nails. Clubbed fingers may indicate chronic cardiac or pulmonary disease. The condition of the joints and occurrence of tremors should be included.

We now come to the chest; regarding the anterior surface, we note first its size, shape and symmetry, together with the degree of development and nutrition. The traditionally long, flat chest may or may not be phthisical. Both the pigeon-breast and funnel-shape should be suspects. Even the barrel-shape of emphysema may harbor tuberculosis. Are there other deformities? Viewing the patient from an angle so that the light falls obliquely, helps to bring out local prominences or depressions, also pulsations.

The line between the base of the neck and the point of the shoulder should be slightly convex. If the left shoulder is lower than the right and this line longer, is the patient left-handed, has he a postural defect or do you suspect an involvement of the left lung? Has occupation or habit influenced this? Is the episternal notch deep? Are the supraclavicular fossae retracted? Remember the sexual differences. Do the ribs slant inward sharply, with an acute subcostal angle? Do the lower ones flare out?

Now watch the movement, first with quiet breathing, then with forced. Is the upper two-thirds of the chest almost stationary, with the lower third and the abdomen doing the work? Age, as well as sex, influences the type of respiration. Does one side lag (both in extent and time), particularly below and above the clavicle? Is the lagging slight or marked, indicative of early infiltration or later contraction from fibrosis and adhesions? Are the intercostal spaces retracted or do they bulge? We may have the former in tuberculosis or pneumonia, the latter in pleural effusion or pneumothorax. The most common local bulging is over the precordium. The cardiac apex-beat should be located. Retraction at this point in systole, with similar retraction at the left, eleventh, interspace posteriorly, is a sign of pericardial adhesion (Broadbent). Localized wasting may be seen over old fibrotic lesions.

Let our subject turn so that we get a profile view. This gives a better idea of the carriage of the head, length of neck and the relative depth of the upper and lower chest

and the size and shape of the abdomen. It demonstrates especially the proportion of costal and abdominal respiration.

Another quarter-turn and we are looking at our friend's back. The spine should be slightly concave. Any abnormal curvature should be noted. The scapulae should lie fairly flat, with their angles level, at the eighth dorsal vertebra. In the long, flat chest they usually project like wings. The line from neck to shoulder-tip, which McCrae called the "sky-line," is more easily studied from the rear. Compare its length and slant on each side, also the movement, for lagging, in both extent of excursion and time. Watch the motion of the scapulae for the same factors. The one over a diseased lung may be closer to the spine and show poor expansion. Again observe the lower chest as there is often more motion here than above.

Now, let him resume the chair while we stand behind it and look down over the shoulders. The clavicle makes an excellent sighting point or line, against which to observe the rise and fall of the upper anterior surfaces of the chest. We may make this more striking by placing black marks on symmetrical points and seeing which mark appears first, over the horizon of the clavicle or we may place our hands, with the fingers falling lightly and symmetrically over the clavicles, and watch the fingers. (This is particularly effective with dirty fingers against a white skin!) Black lines may also be drawn along the margins of the scapulae to accen-

uate any lagging there. Let us not forget the use of the skin pencil. Nathan Barlow found it almost as necessary as his stethoscope. It makes us more accurate and systematic and should not be left exclusively to the teachers. The skin, itself, in many instances may be the first feature to attract our attention. It may be unusually hairy, the seat of jaundice, of eruptions or pigmentation. Tinea versicolor and acne are common in tuberculosis. Vasomotor instability is expressed frequently by dermatographia and unprovoked sweating. A common condition in advanced pulmonary tuberculosis is atrophy of the subcutaneous tissue, which is indicated by the persistence of the indentations made by the stethoscope, giving a 'dead' effect.

Passing to the abdomen; we note its size, shape and symmetry, veins, pulsations, eruptions, protuberances, retractions and scars. Peristalsis is not visible normally, except in emaciation. Epigastric pulsations may be due to pleural effusion on the left, displacing the heart, or to hypertrophy of the right ventricle, or to emphysema, or may be transmitted from the abdominal aorta. Dilatation of the superficial veins of the epigastrium may be due to emphysema. Bulging due to enlarged liver or spleen, should be noted. The nutrition and degree of movement in respiration are the most important factors in relation to the chest.

After reviewing all this, then, let us raise our glasses,—our eye-glasses, to our very next patient, with—"Here's looking at you!"



The Efficacy of Thoracoplasty in the Treatment of Tuberculosis*

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SINCE the advent of the various operations to produce collapse therapy, the treatment of tuberculosis of the lungs has undergone some radical changes. While this paper deals solely with the surgical aspect in the treatment of the tuberculous, it must not be inferred that this method supersedes the medi-

cal treatment of this disease. The patient should be given a trial under medical care but there is still too much procrastination to prolong this in the light of the present knowledge of the results following the operation of thoracoplasty. It must be understood that even after operation there must naturally be no relaxation in the medical treatment of this disease.

* Read before the All - Philadelphia Tuberculosis Conference, Dec. 15th, 1937, Philadelphia, Pa.

There are many who still are unconvinced that the operation of thoracoplasty is an efficient method of procedure. It is erroneous and harmful to state, however, that after all methods of obtaining collapse of the lung have failed, thoracoplasty should be performed. This has led to an indeterminate postponement of the operation, which has caused untold harm to the patient. The delayed operation is harmful because of the danger of infection to the contralateral lung, the original focus being now too far advanced to derive any benefit from any operative procedure. Education of the phthisiologist and the general practitioner must be continued.

Admitting that there are many cavities that cannot be closed by the usual procedures of pneumothorax, phrenic exeresis, and pneumonolysis, it will then be necessary to resort to more radical measures, namely, the operation of selective extrapleural thoracoplasty. The magnitude of this operation must not be underestimated, but the benefits derived therefrom are manifold. In the comparatively short period of four years of our work in the Philadelphia General Hospital, we have had some very remarkable results, and naturally some failures. Unfortunately the majority of the cases have all been too far advanced in their disease to get a universally perfect result.

The efficacy of the results of thoracoplasty are judged by the lessening of the amount of sputum, the number, and finally complete absence of tubercle bacilli, gain in weight of the patient, the return to his occupation and the economic status of the individual to the community.

Sputum

The sputum, whether negative or positive, is a guide, but not the sole guide, in formulating our opinion as to the progress of the case. In addition, physical signs and the study of the x-ray must not be neglected. Eternal supervision of these patients must be the watchword. Several patients, showed negative sputum following the first stage thoracoplasty. While this occurrence is always gratifying, these cases must be followed with the utmost care by means of physical examination, examination of the sputum and x-ray

examination in order that future signs of a reactivation of the tuberculous lung may not be overlooked. The same statement is true concerning the tuberculous after any of the several stages of operation that may be necessary to perform. After every stage of thoracoplasty there is a marked lessening in the amount of sputum. As a result of this there is also a marked lessening in the number of bacilli per hundred fields. We do not report sputum as negative unless we have made several examinations. In addition, we use the 24 hour concentration test and confirm the examination. Comparatively, recently another test has been advocated, when the patient has been judged sputum negative by the above tests, a lavage of the fasting stomach in the morning and examination of these contents under the microscope, is resorted to. If after this and the foregoing examinations the sputum is still negative, then one may be assured that the patient is ready to go back into society. The reduction in the amount of sputum makes the second and the succeeding stages of thoracoplasty less dangerous. A few patients will impart the information that they have had no cough since operation. For example a young girl, (E. K.) one of the poorest risks we ever operated upon has absolutely no cough. Still we cannot consider her free of tuberculosis.

Weight

We have had some very remarkable instances of consistent gain in weight in the majority of our patients following the operation of thoracoplasty. Naturally some gained more rapidly than others. Before operation many of these patients could not gain even under the same environment. We have recorded increases in from 8 to 52 pounds with negative sputum. Even when the sputum remains positive following thoracoplasty, increases in weight have been noted between stages; after the final stage in many, increase in weight is consistent. One patient in particular (A. F.) weighed 86 pounds before operation. She had four operations performed. Recently she reported a gain of about 35 pounds. It is obvious that gain in weight is an important factor in the ultimate recovery of the patient, especially if further stages of operation are contemplated.

Operation of Thoracoplasty

The efficiency of the operation of thoracoplasty depends on the ability to apply the proper procedure for the existing lesion. It must be selective consequent upon the location of the cavity. A cavity located at the apex may require only one stage, whereas a cavity at the base or near the base of the lung may require the removal of the ribs over this area only. Again when the entire lung is affected a massive thoracoplasty performed in several stages becomes necessary, provided the contralateral lung is not diseased. Even if the contralateral lung is tuberculous the influence exerted by a well planned thoracoplasty may help to heal the lesion in the opposite lung. It is due to the fact that with the lessening of paroxysms of coughing the smaller amount of sputum has less chance of being aspirated into the contralateral lung. Bilateral thoracoplasty is efficient in bilateral pulmonary tuberculosis especially when cavities exist at both apices, with the rest of the lung in good condition. We have had three patients in whom we operated on both sides.

One of the most discouraging complications of pulmonary tuberculosis is tuberculous laryngitis. Thoracoplasty frequently benefits this affection because less sputum passes the vocal cords. Unfortunately this improvement is not always as permanent as it should be since even thoracoplasty fails ultimately to arrest the disease, although at times the initial improvement is marked. An adjunct operation which makes the operation of thoracoplasty more efficient is a phrenicectomy resulting in permanent paralysis of the diaphragm. This has its good effects after a complete thoracoplasty where a residual cavity remains at the base of the lung. In patients in whom this operation was performed negative sputum followed. After all stages of the operation of thoracoplasty are completed bronchiectasis is revealed by lipiodol aspirations. In these cases also a phrenicectomy has relieved the patient of positive sputum.

Return to Occupation

A practical question was propounded at a recent clinic by a member of the United States Civil Service Commission as to whether patients who have had thoracoplasties per-

formed should be allowed to take the examinations. While I could not go into detail on account of the very limited time at my disposal, several instances of patients sufficiently recovered to return to work were cited. Some of our female patients after two or three stages returned to their homes and were able to conduct the duties of their households in the usual manner. A man 52 years old, the oldest patient upon whom we performed a two stage operation resulting in a negative sputum, was able to return to his former occupation. Up to October 1937, twelve patients have returned to their former occupations.

Economic Status

As a result of the operation of thoracoplasty the economic value to the county and state cannot be overestimated in the return of tuberculous patients to their home and occupations. From an existence of forced idleness these patients are restored again to a life of partial or entire usefulness. Due to the fact that they will not transmit their infection to others they are able once more to freely mingle in the society of their family and friends.

In a mid-western sanatorium where they have been performing thoracoplasties for the past 22 years the waiting list for tuberculous patients has been abolished. Empty beds are now available. These facts speak for themselves and I believe they should demonstrate to the most skeptical that the efficiency of the operation of thoracoplasty has a definite place in the category of the treatment of the tuberculous.

Conclusions

1. The operation of thoracoplasty should not be a last resort procedure.
2. Sputum is a fine index of the efficiency of the operation of thoracoplasty. A consistent negative examination means the disease has probably been arrested.
3. The patient usually gains weight after the operation of thoracoplasty. We reported gains in weight ranging from 8 to 52 pounds.
4. Graded extrapleural thoracoplasty is the ideal operation to perform. Bilateral thoracoplasty is efficient in selected cases.
5. Several of our patients have returned to

their former occupations after the arrest of their disease.

6. The saving to the county and state cannot be overestimated.

7. It must be borne in mind that on account of the advanced cases we have been compelled to operate upon, our mortality is a little greater than that reported from other clinics.

THORACOPLASTY FOR PULMONARY TUBERCULOSIS

Philadelphia General Hospital

December, 1933

December, 1937

Total number of patients subjected to thoracoplasty	83
Total number of stages	211
Patients discharged from the hospital as completed cases	40

Present Status

Apparently arrested	20
(No symptoms, negative sputum, x-ray	

evidence of inactive lesion)	
Improved	15
(7 of these have negative sputum, 1 has pulmonary disease arrested but chest wall sinus persists)	
Unchanged or worse	4
Untraced	1
Dead	21
Complicating mixed infection	
empyema	5
Bilateral disease without empyema	11
Unilateral disease without complications	5
Secondary hemorrhage—36 hours	
Mediastinal flutter—5 days	
Chronic nephritis—4 mos.	
Miliary spread—5 mos.	
Spread to other lung—1 yr.	
Patients who left the hospital with surgery not completed	6
(Refused further operation or expect to return later)	
Patients who are still under treatment in the hospital	16
(6 of these have negative sputum)	

The Use of X-Ray in Chest Examinations by the Physician in General Practice*

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THE VALUE of the x-ray in the diagnosis of lesions within the chest cavity is well established. Even the most skilled specialist in chest diseases now considers an examination incomplete without properly made roentgenologic studies. Today, the services of a competent roentgenologist may be obtained with little difficulty, and the well informed, conscientious surgeon, internist, or general practitioner no longer attempts treatment based upon a diagnosis made from physical signs alone.

To those living in cities and larger towns, the problem of securing reliable roentgenologic examinations and opinions is comparatively simple, since a trained roentgenologist

with adequate equipment may be found immediately available. The doctor in the smaller town will find it advantageous in many cases to provide himself with necessary x-ray equipment, have the roentgenograms made in his office, and mail them to some accredited roentgenologist for interpretation. By this means, his patients will be afforded the benefit of x-ray examination and diagnosis, and he a guide to treatment.

As was stated in a previous paper, the physician who contemplates buying x-ray equipment should first decide for what purposes it shall be used, and then acquire only such equipment as will be needed for these purposes. Before making any purchases, it would be well worth his while to consult a roentgenologist, who would gladly lend his coopera-

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tion in this respect. There are, however, many physicians who have offices equipped with x-ray apparatus, yet use it to little advantage, if at all. Perhaps the roentgenograms are not clear as they should be. The defect may be caused by some mechanical maladjustment, or lack of an accessory, which may be remedied with small expense. Here, again, the advice of a roentgenologist or someone familiar with the proper use of x-ray equipment will be valuable. Moreover, it should not be forgotten that roentgenograms can best be made by an experienced technician. For this reason, it usually is advisable that the busy doctor have his nurse or assistant take a course of training in roentgenography, rather than assume the responsibility of making them himself.

The equipment required for making satisfactory radiographs of the chest is not extensive and may be purchased at moderate cost. Even smaller machines on the market at present have sufficient capacity to make accurate roentgenograms if the newer, fast screens and films are used. The importance of good intensifying screens cannot be over-emphasized. A mechanical timer is also imperative; guess work has no place in the operation of x-ray equipment.

Since the lungs contain principally air, they lend themselves well to study by roentgen-rays. The air containing tissue permits the rays to pass through with little resistance, causing the film to be dark in proportion to the amount of air in the tissues. In a normal, well aerated chest, only the bronchi and blood vessels cast white or gray shadows over the otherwise homogeneous dark lung field. One can readily understand that replacement of the air containing tissues by the products of inflammation, as edema, cellular infiltration, or fibrin, will change the dark lung field to varying grades of whiteness by filtering out more of the x-rays, the degree of whiteness being in direct proportion to the thickness and density of the lesion producing the shadow. Interpretation of a film, therefore, is made by studying the comparative densities, the extent and arrangement of the whiter shadows which replace the normal dark lung field.

In the presence of fluid in the pleural cavity, for example, we see a dense homo-

geneous whiteness with a comparatively distinct outer contour. In early stages of pleural effusion, the white area is more pronounced at the dependent parts, or the periphery of the bases; in advanced stages, the fluid may replace the entire lung tissue on one side, deflecting the mediastinal structures to the opposite side.

When there is infiltration into the lung tissue, such as is produced by tuberculous pneumonia, mottled shadows of less intensity of whiteness, with very irregular and indefinite edges, are observed in the midportion of the lung, the primary lesion generally being located midway between the hilum and the lateral periphery of the apex. Tubercles and conglomerate tubercles always give the shadow of the infected area a coarse, granular appearance, resembling flakes of snow. Figure 1 shows a case of miliary tuberculosis which illustrates well the granular shadow of miliary lesions. At the pneumonic portion the granules are thicker, as in a solid layer of snow, while the surrounding scattered tubercles are similar to individual snow flakes, blown, so to speak, from the main drift. This last mentioned feature differentiates tuberculous pneumonia from non-tuberculous. Pneumococcic pneumonia produces a far more homogeneous shadow without the characteristic granules.

The extent of both these lesions is dependent, of course, upon the type. In lobar pneumonia, the disease is confined to one lobe, but if the causative organism is tuberculous, we soon have an extension to other portions of the lung on the afflicted side and perhaps to the opposite side. In bronchial pneumonia, parts of two or more lobes may be infiltrated, producing small, poorly defined white areas.

A brief description of the outstanding roentgenographic features which one must consider in interpreting shadows produced by the more common pulmonary infections is given below.

Pneumonia.—Acute bacterial infection of the parenchyma of the lung, which is known as pneumonia, may be lobar, lobular, or bronchopneumonic. The virulence of the organism probably has some influence on the distribution. During the first twenty-four hours, no definite consolidation may be visible in the film, yet by the end of the second twenty-four

hours an entire lobe may be radiopaque. On account of the nature of the disease, few of these patients require roentgenographic examination for diagnosis; moreover, removal of the patient from bed for this purpose is a dangerous procedure.

In early stages of lobar pneumonia, the roentgenogram may demonstrate only a conical shaped shadow with its base at the periphery and its apex pointing toward the hilum. The cloudiness is homogeneous in appearance and is more distinct in the midportion, gradually shading into gray and then into the normal dark lung shadow.

In complete lobar consolidation of the right upper or right middle lobe, a rather sharp edge of demarcation is noted (Fig. 1). When

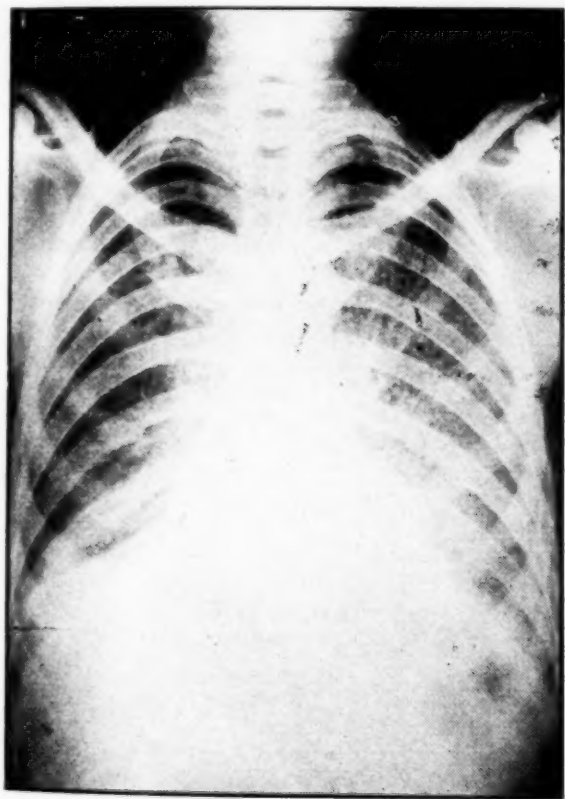


Fig. 1. Miliary tuberculosis of both lungs. Note granular shadow cast by tuberculous infection.

the pneumonia area is located in the lower lobe on either side, the upper border of consolidation does not have a sharp line of demarcation. This is also true of the lower border of the upper lobe of the left lung, and is due to the anatomic shape of the lobes. The diaphragm may be slightly elevated on the affected side, though there is little, if

any, lateral shift in the position of the mediastinal structures.

Tuberculosis.—Early tuberculous lesions are found, more often, in the upper lobes below or behind the clavicle (Fig. 2). The white

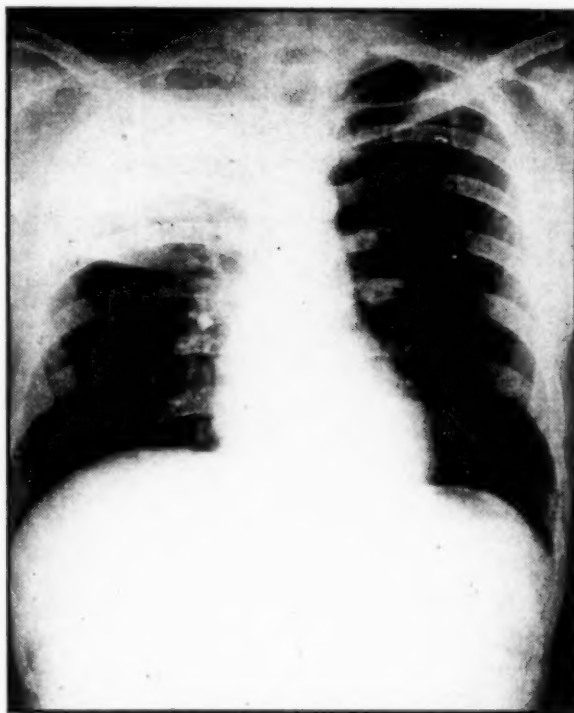


Fig. 2. Typical lobar pneumonia of upper lobe of right lung, with acute bronchitis of remaining lung tissue.

shadow caused by the lung infiltration simulates that produced by pneumonia; it is distinguishable, however, by its granular appearance and the fact that grayish white lines, caused by involvement of the lymphatics around the blood vessels and bronchi, extend from the area of cloudiness toward the hilum. There is, in addition, an enlargement of the lymph nodes at the hilum.

In advanced cases, the infection is more widely distributed and may be accompanied by the formation of a cavity in the center of the area of greatest infiltration. At this stage, the glands in the hilum of the opposite lung also may be enlarged.

In late cases we see a still further involvement of the originally infected lung, with perhaps a more extensive invasion of the opposite lung. Usually, by this time sufficient fibrosis has occurred to pull the mediastinal structures toward the side of the primary infection, as well as to cause thickening of the pleura, both visceral and parietal, on that

side. As a rule, a small amount of fluid may be detected along the costophrenic angle.

Bronchitis.—Signs of inflammation of the bronchi are not infrequently observed in patients who are troubled with a persistent cold. The nasal accessory sinuses may also be infected. The characteristic roentgenographic feature of bronchitis is an increase in density of the bronchial shadows on both sides as they radiate from the hilum. This finding is always more pronounced at the bases (Fig. 3).

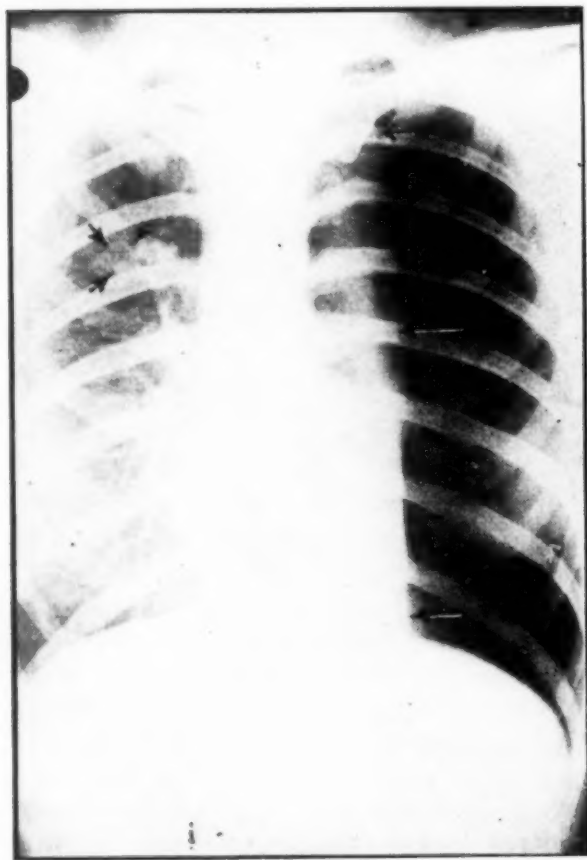


Fig. 3. Early pulmonary tuberculosis with involvement of a small area of parenchyma above right hilum. A spontaneous pneumothorax on left had collapsed the lung against the mediastinum; pleural adhesions at extreme apex and extreme base on this side prevented complete collapse. Arrows indicate edge of collapsed lung.

Bronchiectasis.—The changes observed in bronchiectasis are an exaggeration of those found in bronchitis, the bronchial markings being greatly intensified both in width and density. At times, the bronchial sacculations simulate small areas of pneumonic infiltration. The exact extent of the lesion may be demonstrated only on films made after the instillation of iodized oil into the bronchial

tubes. In a large majority of cases, the pathologic process is confined to the lower lobe and is bilateral.

In the interpretation of roentgenograms, the shadows cast by the enlarged breast, muscles, and bony structures of the thorax must not be mistaken for disease within the lung. On first thought, this seems an unnecessary caution, yet these shadows have been sources of error in many cases. The thickness of a large, dependent breast may produce a white shadow over the base of the lung field which is much like that produced by fluid. In muscular men, the pectoral muscle shadows may make diagnosis difficult. But perhaps the most frequent error in diagnosis is caused by the confusion of the vertebral border of the scapula with thickening of the pleura.

The majority of such mistakes may be avoided if one bears in mind that these lines and shadows overlying the lung field, if followed to their termination, will be found to lead outside the chest cavity and thus can be easily identified as parts of extrapulmonary structures (Fig. 4).

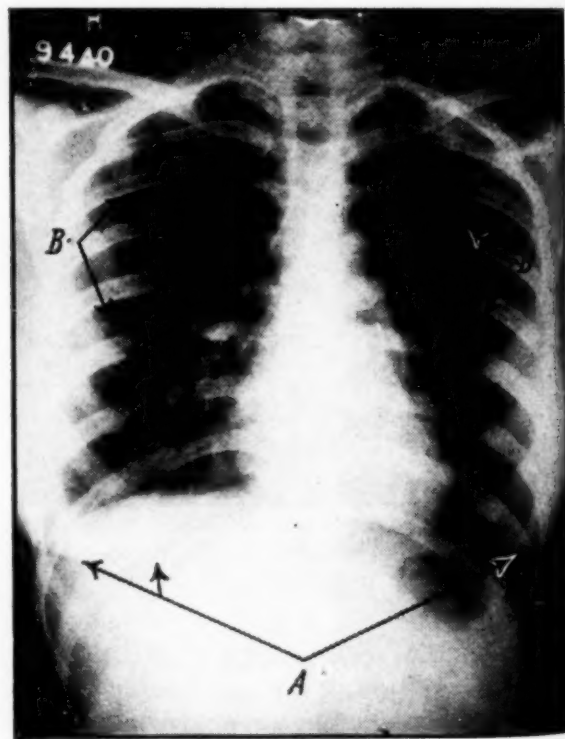


Fig. 4. Subacute bronchitis of bases of both lungs (A) arrows point to vertebral border of scapula; (B) arrows show outline of breast; these structures occasionally are interpreted as representing intrapulmonary disease.

It should be clearly understood that a roentgenologic examination of the chest does not in any way lessen the importance of a carefully taken history and a thorough physical examination of the chest. The roentgenographic characteristics of many chest diseases are remarkably similar, and a differential diagnosis can be made only by correlating these findings with the clinical record. Films sent by mail to the roentgenologist

for interpretation should always be accompanied by a record of the history and physical findings.

By studying the reports and films together after the roentgenologist has made his diagnosis, the physician will not only have a better understanding of his patient's condition, but will himself soon acquire an increased knowledge of the interpretation of roentgenograms.

An Evaluation of Procedures Used in the Diagnosis of Pulmonary Diseases*

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THE results of medical investigation have made the diagnosis of pulmonary disease easier yet at the same time more difficult. There are improved methods of study, but an enlightened public now demands more exact information than in former years. Health education has done a great deal to inform the public of the symptoms and danger signs of disease, but in the last analysis the patient must turn to his physician for guidance. In order to meet this responsibility adequately, our methods of examination must be thorough and our advice definite.

There is perhaps little to offer in a present-day discussion of diagnostic methods that is not more or less familiar to every practicing physician. In most instances, it is not the lack of means but rather the failure to utilize available methods that leads to delayed or incorrect diagnosis.

The fact that 60 to 65 per cent of persons entering tuberculosis hospitals today have far-advanced tuberculosis is sufficient to warrant inquiry into the effectiveness of present diagnostic methods. It is true that frequently medical advice is not sought until advanced pathologic changes have taken place, and often patients fail to heed the warning of their physicians. Delayed admission to already crowded hospitals may also be a factor, but the major responsibility falls upon the examining physician.

The diagnosis of advanced pulmonary disease offers but few difficulties, but early recognition may not be so simple. This is especially true of tuberculosis. Careful judg-

ment gained from painstaking study is essential for either a positive or negative diagnosis. We must be guided by the history, physical signs, visualization of the pathology, and the laboratory findings. To say that one can be used to the exclusion of others would be presumptuous, no matter how skilled the examiner may be in his particular field.

Clinical disease becomes manifest when changes in body structure cause disturbance of functions, both local and general. It is this deviation from normal which we attempt to recognize by diagnostic methods. Alteration of body metabolism leads to systemic disturbances becoming apparent in symptoms. Symptoms may be present without demonstrable evidence of structural change, or signs may be elicited with no evidence of systemic disturbance, or both signs and symptoms may be present. The clinician finds himself confronted with this confused picture when he is called upon to make a diagnosis.

The importance of a careful history cannot be overemphasized. A recent review of 1000 histories of patients coming under our observation in a tuberculosis hospital revealed some interesting facts. In many instances there had been a lack of proper interpretation of symptoms as given by the patient at the time of first medical contact. Significant symptoms were frequently ignored because of the patient's general appearance of good health. The expectoration of blood was given little consideration in some cases because of a negative stethoscopic examination. Many of the cardinal symptoms of tuberculosis went unexplained because of the absence of physical signs, and in far too many instances the sputum was never examined. There was little doubt that the absence of physical signs or

*Read before a General Meeting of The Medical Society of the State of Pennsylvania, Philadelphia Session, Oct. 7, 1937. Reprinted from the Pennsylvania Medical Journal, Vol. 41, No. 7, April, 1938.

the inability of the examiner to recognize deviations from the normal resulted in delayed diagnosis.

Physical diagnosis has developed over a period of many years and still constitutes one of our most important procedures. The recognition of abnormal signs in the chest and the correct interpretation of these signs depends a great deal upon the ability and experience of the examiner. Physical examination, however, may fail even when done by the most expert. The inability to elicit abnormal physical signs is not sufficient reason to make a negative diagnosis. Since Laennec read "Memoirs on Auscultation" before the French Academy on Feb. 28, 1818, more than 100 signs have been described for the purpose of identifying pathologic changes in the lungs. The majority have now been discarded and are of historic interest only. Auscultation, however, has remained an almost indispensable part of diagnostic routine. For many years it commanded an outstanding position, but now the roentgen ray has laid bare the limitations of the stethoscope. Therefore, these limitations must be accepted in the light of better medical practice. The roentgen ray has greatly enlarged the field of inspection into other relatively inaccessible realms. It has in fact become the best method of detecting small areas of disease in the lungs. It has revealed that the so-called silent chest may contain pathology, either minimal or advanced. Roentgenography, like auscultation, has its limitations and as a single procedure still leaves much to be desired. It is, after all, an interpretation of shadows. Although the skilled roentgenologist can give opinions of etiology with considerable accuracy based upon the appearance and location of the shadows, their significance in many instances must be determined by the clinical picture. The great need in roentgenology today is to find ways and means of making the roentgen ray available for the routine examination of both the sick and the apparently healthy. The recent development of comparatively inexpensive paper films has opened a field of chest roentgenography heretofore unavailable because of economic factors. These developments are to be welcomed, but at the same time the diagnostic perspective should not be narrowed to photographs of lights and shadows. "What is spoken of as a clinical picture is not just a photograph of a man sick in bed," said Francis W. Peabody; "it is an impressionistic painting of the patient surrounded by his home, his work, his relatives, his joys, sorrows, hopes, and fears."

Chronic basal infections of the lungs, a syndrome which includes bronchiectasis, is one of the most common of pulmonary diseases. It is only in recent years that the more common use of iodized oil in conjunction with

the roentgen ray has served to clarify and to differentiate lesions of this character. The large number of terms with which such lesions have been designated in the past is an indication of the confusion with which they have been regarded. They have been distinguished by such terms as chronic bronchitis, chronic pneumonia, recurrent pneumonia, unresolved pneumonia, chronic interstitial pneumonia, as well as bronchiectasis. With modern methods of investigation, including the roentgen ray, after the administration of iodized oil and direct visualization of the bronchial tree through the bronchoscope, the frequency of this type of lesion becomes increasingly apparent.

The use of the bronchoscope has added to knowledge of the extent and character of these lesions by making actual inspection of the diseased area possible. It is also important when a foreign body is concerned, and it is especially useful in the collection of material for culture. Because of partial obstruction, crusted secretion, and other causes of a similar nature, it is frequently impossible to obtain good penetration of lipiodol into the lung bases which will give a clear picture of the character and extent of the bronchial pathology. Preliminary bronchoscopy with opening up of the diseased area, as well as direct instillation of the oil through the bronchoscope, makes possible freeing of the affected region more complete and roentgen-ray films more useful. It is not necessary, however, to depend entirely upon the bronchoscope to instill lipiodol into the bronchial tree. In many instances direct tracheal instillation with a syringe is satisfactory and can be accomplished in the office. The information derived, especially with the use of oblique angles for roentgen-ray observation, may place an entirely different interpretation upon the etiology and change the whole plan of treatment.

The thoracoscope offers a means of direct visualization of pleural surfaces. Although it is now used principally for the localization of adhesions in pneumolysis work, it can give valuable information about lesions of the visceral and parietal pleura. Tubercles, points of perforation in spontaneous pneumothorax, and pleural tumors may be brought into direct view.

The possibility of pulmonary tuberculosis must always be considered in any differential diagnosis of pulmonary disease. Tuberculosis is no respecter of age, nationality, or social position. It appears constantly in any medical practice and frequently under the most unexpected circumstances. For that reason, it should always be in the mind of the examiner in any illness of indefinite etiology. The early recognition of the disease in its clinical course requires detection and interpretation

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of the signs of pathologic changes in the lungs, familiarity with its symptoms, and a correlation of objective and subjective deviations from the normal. Disturbed function manifesting itself in significant symptoms may be present without demonstrable pathologic lesions. On the other hand, changes in the lung tissue resulting from former illness may exist without particular significance or they may be the source of future incapacity. We must differentiate, therefore, between tuberculous infection, clinical tuberculosis, and inactive tuberculous pathology.

Allen Krause, whose sound judgment in tuberculosis work is well known, says "Tuberculin testing is the only procedure which unassisted can settle the diagnosis of tuberculosis, but it can do this only in a negative way; and in that respect its services are the antithesis of those provided by the finding of bacilli which works positively toward making a diagnosis absolute."

Tuberculous infants and children in general react more vigorously to tuberculin than adults. The percentages of positive reactors is lower and for that reason the test assumes more value as a diagnostic agent. In fact, its simplicity, safety, and slight discomfort make it invaluable in the study of children. A positive tuberculin reaction always means the presence of tuberculous infection. It does not necessarily mean clinical disease, a point which should be emphasized at this time when tuberculin testing is being carried out so extensively in large groups. Failure to get a positive reaction, except in the presence of acute miliary tuberculosis, advanced tuberculous pathology, or during some acute infectious disease makes it possible definitely to rule out tuberculosis. The potency of the tuberculin, the dosage, and the technic are

important for reliable results. The recent development of the purified protein derivative by Long and Seibert has placed tuberculin testing on a reliable and rational basis.

The tuberculin test should be employed as a routine in the examination of children. Frequently valuable information in a negative way can be obtained in adults. When supplemented by roentgen-ray examinations of the positive reactors, it is undoubtedly the best present-day method of determining the presence of tuberculous pathology in the lungs.

The early recognition of progressive pulmonary disease is essential for satisfactory therapeutic results. A diagnosis is not complete with the determination of the presence of disease but must include opinions about its actual or potential dangers, its stage of development, prognosis, and the treatment required. This cannot be done intelligently without a complete clinical picture of the patient constructed from all available methods of study. The bedside experience assembled by thousands of observers over a period of many years is one of the most valuable medical heritages, but the development of methods of visualizing pulmonary pathology has demonstrated the limitations of the human ear. As aptly stated by Waring, "The history of physical diagnosis teaches us that nothing good is ever lost. Auscultation increases the value of percussion; roentgenography increases the value of both. Let the slogan of the stethoscopist be: Listen, look, and listen again." If this practice is followed conscientiously, fewer tuberculous lesions will reach an advanced stage, fewer septic infections will be permitted to cause permanent damage, and more new growths will be discovered at a time when treatment offers some hope.

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Organization News

Notice to Fellows of College.

The Fourth Annual Meeting of the American College of Chest Physicians will be held at the St. Francis Hotel, San Francisco, California on *Sunday*, June 12th. This is one day before the opening meeting day of the American Medical Association. In holding our meeting on Sunday, we are conforming to a request made by Board of Trustees and the Council on Scientific Assembly of the American Medical Association that the meetings of allied or special organizations be held prior to the opening day of the meeting of the American Medical Association. If you have not already made reservations for hotel accommodations; we urge you to communicate immediately with Dr. F. C. Warnshuis, Chairman, Committee on Hotel and Housing; 450 Sutter Street, San Francisco, California.

Committees at Work on Special Issue of the Journal.

The following committees are supervising the work of compiling the June Issue of "Diseases of the Chest."

California Section: Dr. Emil Bogen and Dr. Jane Skillen, Olive View, Chairmen; Dr. Robert A. Peers, Colfax; Dr. Everett Morris, Auberry; Dr. Chas. E. Atkinson, Banning; Mrs. Florence E. Mead, San Diego; and Mrs. Edythe Tate Thompson, Sacramento.

Oregon Section: Dr. Ralph C. Matson, Portland, Chairman; Dr. G. C. Bellinger, Salem; Dr. James M. Odell, The Dalles; and Mrs. Saidie Orr-Dunbar, Portland.

Washington Section: Dr. Frederick A. Slyfield, Seattle, Chairman; Dr. Howard Hull, Yakima; Dr. Ross E. McPhail, Lakeview; Dr. Frank S. Miller, Spokane; Dr. Leon G. Woodford, Everett; and Mrs. B. B. Buchanan, Seattle.

The issue will be known as the Pacific Coast States Issue and will appear in connection with the annual meeting of the American College of Chest Physicians. When completed, there will be a total of ten states which will

have participated in special issues of the journal during the past four years. It is the aim of the Editorial Board of "Diseases of the Chest" to eventually compile special issues of the journal for the forty eight states and the District of Columbia.

Committee on Arrangements for Annual Meeting Hold Meeting.

The Committee charged with the arrangements for the fourth annual meeting of the American College of Chest Physicians met at the Sir Francis Drake Hotel, San Francisco, April 11th. The meeting was attended by: Dr. Wm. C. Voorsanger, Chairman, Committee on General Arrangements; Dr. Harold G. Trimble, Chairman, Scientific Program Committee; Dr. Harry C. Warren, Chairman, Entertainment Committee; and Murray Kornfeld, Executive Secretary of the American College of Chest Physicians. The committee reports that most of the arrangements for the meeting have been completed and a copy of the tentative program will be found elsewhere in this issue of the journal. The Committee extends an invitation to the readers of Diseases of the Chest to attend the scientific sessions. There will be no registration fee.

Chest Physicians Meet at Seattle.

A meeting of the Fellows of the American College of Chest Physicians and invited guests was held at the Washington Athletic Club, Seattle, April 1st. The meeting was arranged by Dr. Frederick A. Slyfield, Chairman of the Washington Section of the June Issue of "Diseases of the Chest" and was attended by the following physicians: Dr. John E. Nelson, Dr. Byron Francis, Dr. Raymond E. Tennant, Dr. Wallace W. Schwabland, Dr. Philip Narodick, Dr. Frederick A. Slyfield, all of Seattle; Dr. Leslie P. Anderson, Elma; and Murray Kornfeld, Executive Secretary of the American College of Chest Physicians. Kornfeld gave a report of the activities and he discussed the program of the American College of Chest Physicians.